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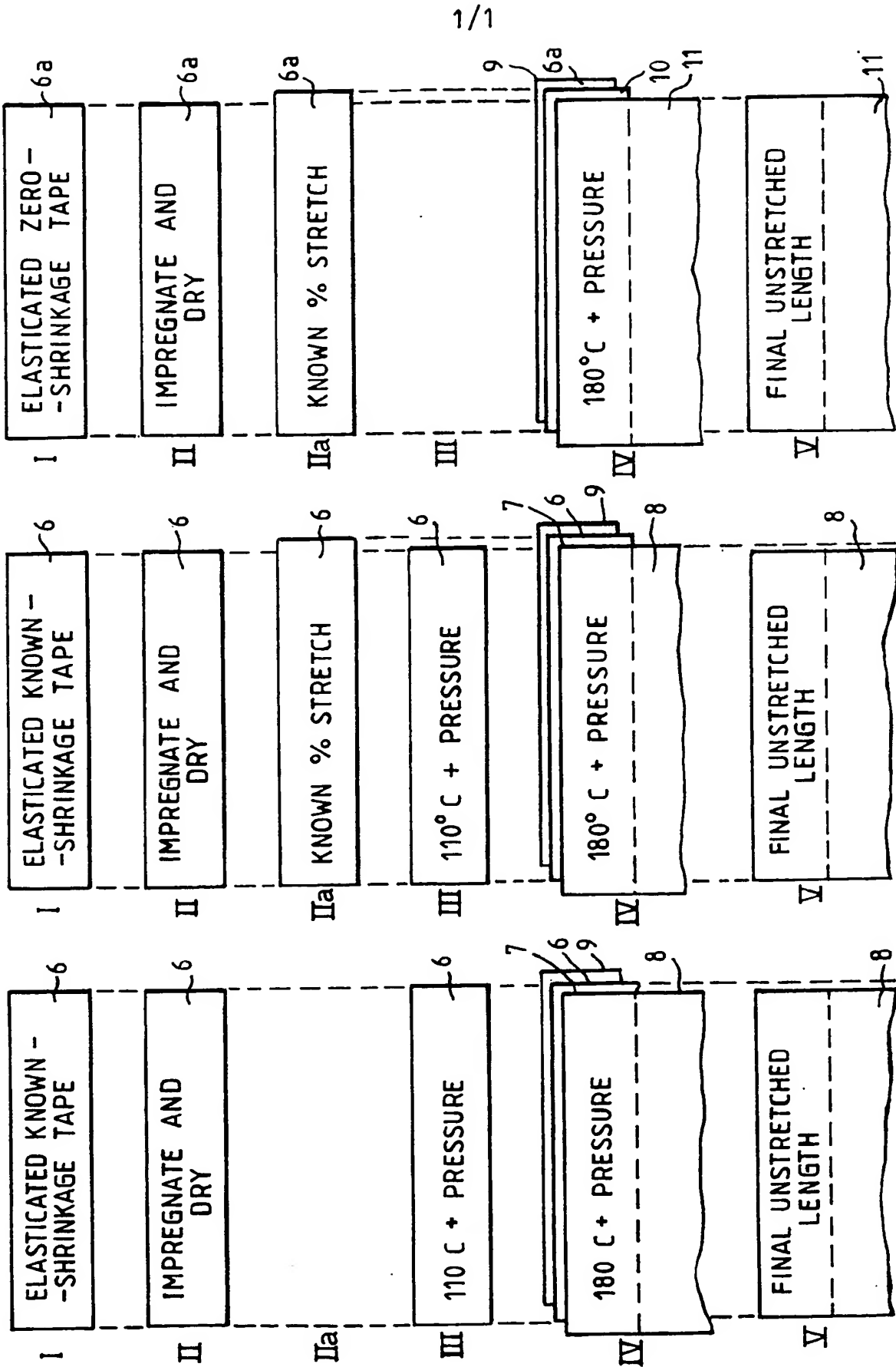
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(54) **Providing fabric with limited elasticity for waistbands**

(57) A waistband is formed of a non-elastic fabric to a surface of which is adhered elastic material arranged to cause slight retraction of the fabric without visible ruching or corrugation. Elastic material of zero shrinkage or for which the shrinkage is accurately known on heat treatment, can be adhered to the fabric by suitable procedures described. The extent of retraction is a few percent only, enough to cause the transverse threads, preferably the warp threads, of the fabric to come together. This few percent of extensibility, over the length of a waistband, is generally adequate to achieve good fit in spite of minor diurnal size variability, or of persons between standard sizes, thus reducing store refunds and exchanges.

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IMPROVEMENTS IN FABRIC OR
GARMENT TECHNOLOGY

This invention relates to fabric or garment technology and more especially to the elastication of regions of fabric, or of garments, to accommodate variations in size of a wearer of the garment.

The invention is particularly useful when used in the construction of waistbands for skirts or trousers, or like articles and for simplicity of description will be predominantly described in relation to this context.

It is commonplace, if skirts or trousers are bought without trial wear or special fitting, e.g. in a retail store branch, for them to be returned or exchanged for a garment of different waist size. Sometimes the purchaser does not accurately know, or is optimistic about, the correct size. Additionally, waist size can vary over short periods, e.g. by amounts of up to 2 inches (5 cm) per day, so that a garment which is accurately sized when purchased can nonetheless be uncomfortable for extended period of wear. Some people, moreover, have a basic size which lies between the standard sizes available, or are proportioned in such a way as to render it difficult to find clothes of a

comfortable fit overall.

It has previously been proposed to provide elasticated wrist or ankle cuffs, and elasticated waistbands, for various adults and childrens garments. The elastication typically comprises a length of stretchable tape-like fabric material woven or knitted to enclose elongate bands or tapes of rubber. To fabricate a waistband, for example, the tape is stretched to a desired length within, or up to, the maximum elongation available and then fixed by stitching or heat-fusible adhesive to the fabric at the waistband. For best results the elasticated tape is such as will not be affected in its properties or basic unstressed length by these procedures, especially the heat of fusion, and will therefore pull the waistband back to a predetermined size. None the less, such a waistband, when it has contracted to this predetermined base length does so from an extent of elongation such that the fabric of the waistband corrugates or ruches transversely in a more or less regular fashion.

There are accordingly two disadvantages with such prior art waist elastications.

Firstly, to give enough force to provide a waist grip over a variety of sizes, the elasticated tape has considerable extension capability. There is accordingly

the facility for misuse, by using this elasticity not only to accommodate minor size fluctuations or minor requirements of sizing or proportion but also, by mistake or optimism, to accommodate large substantive size differences beyond the ability of the attached garment fabric panels to accept without distortion. The resultant appearance is not a good advertisement for the manufacturers original product. Secondly, the externally visible ruching is not always acceptable for the waistband of tailored or formal garments, or for growing children, who associate it with the size variability requirements of infants clothes.

Our invention sets out to overcome these disadvantages and is based on the realisation that the proportional size variation, in a waistband or the like, necessary to maximise comfort (i.e. to accommodate diurnal size variation, body proportionality differences and intermediate basic sizing) and optimise appearance, as distinct from that necessary to accommodate substantive size differences, is small enough to be obtained by a different, non-ruching mode of size change on the fabric. We do not wish to be bound by any theory as to the operation of our invention, but it seems probable that the initial stage of inward tension on a length of fabric. e.g. the first 10% or so in many fabrics, is taken up by causing those threads lying transverse to the tension direction to approach closer

to one another. It appears that this can happen with a woven material or a knitted material, e.g. the warp-knitted elasticated tape commonly used for waistbands). Only after this stage is complete does the fabric itself accommodate the tension by corrugating or ruching.

The invention is therefore based on suitable selection of materials and operation conditions to bring about in a reproducible fashion this relatively small extensibility and contractability as needed for comfort adjustment, without risk of over-extension or externally visible ruching.

In one aspect the invention consists in a textile assembly comprising at least one non-elastic woven fabric element to a surface of which is adhered an elongate straight strip of material capable of elastic stretch and retraction: in which fabric element one set of woven threads is adhered at right angles or substantially at right angles, to the strip direction; and in which full retraction of the strip causes the threads of that set to approach one another, where they contact the strip, without causing corrugation or ruching of the fabric element; the elasticity of the strip permitting the textile element to be extended to the limits of its non-elastic weave.

It is primarily envisaged that this assembly will constitute or form part of a waistband for a skirt or trousers, where the extent of available extension and retraction is adequate to provide comfortable wear without danger of abuse by overstretching and where the absence of ruching or corrugation gives a significant improvement in "tailored" appearance.

Thus the fabric element may be a separate band of fabric, but is more often to be embodied as the upper edge region or margin of a garment panel. If necessary, this panel can be cut, and adhered to the strip, slightly on the bias to maintain the fit of the garment whatever the stretch situation.

Usually the elongate strip is located between two layers of textile, one being the garment panel and the other a bias-cut backing layer.

The strip may be formed generally as an elasticated waist band of a structure known per se with an extensible cover extending over and mutually locating parallel threads of elastomeric material such as natural rubber. The cover may, for example, be warp-knitted to accommodate the elasticity, and it is common to wind each thread with fine cotton to protect it and to ensure good union with the surrounding fabric. In accordance with the present invention such a strip will be adhered

by fusible adhesive to the textile element e.g. waist band or margin of a garment panel. It is envisaged, depending upon the exact nature of the embodiment of the present invention that the elastic components of the waistband, i.e. the threads therein, shall either (a) possess an accurately known and reproducible shrinkage on application of heat (i.e. when the adhesive is fused) by which is generally meant a shrinkage up to 15% more usually 5-15% e.g. 6-12% specifically 8%, all to within an accuracy of 1% of the original length or (b) possess resistance to shrinkage, e.g. give shrinkage less than 1%, when heat-affected.

Such strip material can if desired be folded longitudinally or otherwise provided as a double thickness. This makes it possible to use an intrinsically thinner grade of elastic strip. It also assists in keeping the price of the garment down since such a doubled structure does not need lining.

Specific embodiments can therefore comprise, as the inner and adhered elastic member of known properties related to the adhered thread spacing, and referring to each case to the expanded position of the strip where the threads are suitably located as in the basic fabrics i.e. not pulled together:

- (i) elasticated waistband material, at its

original length, but with an accurately known amount of retractability imparted by heat shrinkage

(ii) as (i), plus a small known amount of initial stretch

(iii) elasticated waistband material, stretched to an accurate known amount beyond its original length, and of essentially zero retractability from that length in applied heat.

In another aspect the invention comprises a method of providing a garment or the like made of inextensible fabric with a linear zone of limited and concealed elasticity, for example a method of providing a skirt or pair of trousers with a stretchable waist region, in which:

(i) an elongate straight strip of material carrying at least one its surface a continuous or interrupted loading of fusible adhesive material; capable of elongate stretch and retraction; and in a relatively expanded form; is laid against a surface of the inextensible fabric at such an orientation that one set of threads thereof, preferably warp threads, extend at right angles or substantially at right angles to the strip

(ii) heat and pressure are applied to fuse the adhesive and cause the strip and fabric to adhere, and

(iii) the assembly is allowed to retract to the unstretched form:

the elongate strip being selected such that the extent of retraction to the unstretched form does not exceed that required to pull the threads closer together without thereby rucking or corrugating the fabric.

In this method an elasticated band may be used, of the type as described above. Thus by the term "relatively expanded form" is included (a) a prestretched strip, returning accurately to its original length and usually therefore made of zero-shrinkage elasticated band and (b) a strip which is not preextended but which shrinks by an accurately known amount on the application of the heat required to fuse the adhesive, being thereafter extensible above that new length or (c) a combination of (b) with a known prior stretch.

Temperature and pressure are conventional for such adhesive, the temperature being for example 170°-180°C for p.v.c. The final extendability range is up to 20%, more preferably 5-15% e.g. 8-12%. In a particularly

valuable improvement of the above method, as applied to the elasticated band there is applied an intermediate heat and pressure stage between steps (i) and (ii) above and prior to fixing the band to the fabric. This is effected at e.g. 100-120°C, preferably 110°C, so that the elasticated material does not shrink and is then more controllable during step (ii).

Thus, there is also provided according to the invention, as a vendible article, an elasticated band of the type described, impregnated and/or coated with fusible synthetic polymer adhesive such as polyvinylchloride, and subjected to a prior heat and pressure stabilisation e.g. at 100-120°C without causing retraction of the band. Typically, it will be a band of accurately known and reproducible shrinkage characteristics at fusion temperatures for the adhesive i.e. preferably within the range 6-12% by an accuracy of 1% of original length.

The invention will be further described with reference to the accompanying drawings, in which:

Figure 1 ~~Similarly~~ shows by way of example the stages of a first procedure for producing a waist band,

Figure 2 similarly shows the stages of a variant on such procedure, and

Fig. 3 shows a further such procedure.

A first method of producing a comfort-adjustment waistband is shown in in Figure 1.

The operation of the this embodiment is dependent upon using a strip of selected elasticated tape (Stage I). This is a well known material per se, and consists of a plurality of parallel rubber strands, each wound with a cotton thread, utilized as a form of transverse weft fibre in a warped knitted fabric. The particular grade of elasticated strip utilized has the novel characteristic that, upon suitable heating, it contracts accurately to a predetermined amount of, for example, 8% or 10%. By accurately we mean that the final dimension, of 8% decrease in length (or whatever figure is specified) is accurate to within plus or minus 1% of the original length.

This strip 6 is provided, in the unstretched state, with a surface or impregnation loading of heat fusible adhesive in a solvent, and allowed to dry (Stage II).

The strip 6 carrying the adhesive is then treated under heat and pressure at a relatively low temperature of 110°, below that at which the elasticated tape

shrinks. There is thus provided (Stage III) a fused adhesive impregnant within the threads and fibres of the elasticated tape, the whole being still of the same length as the original.

This pretreated tape 6 is thereafter applied along another fabric tape 7 or along the margin of a garment panel 8, and preferably overlain at the back with some form of backing strip or tape 9, for example a fabric cut on the bias to accommodate expansion. The garment panel 8 may be slightly bias cut to assist in its maintenance of the desired tailored appearance.

Uniting of this pretreated tape with the margin and the backing is effected under pressure at, in this example, at 160° or up to 180°C (Stage IV) whereby the elastic fibres in the tape shrink (Stage V) by an accurate predetermined amount (8% or 10% by way of example) so that the fibres of the outer strip or of the upper margin of the garment panel are pulled inwards into closer relationship without however corrugating or rucking the fabric.

The elastic material is used in an unstressed condition, susceptible of shrinkage, and is first pretreated to stabilize its shrinkage condition sufficiently that it can be fixed by heat and pressure to the garment margin.

It will be apparent to a man skilled in the art that this tape 7, 6, 9 stabilized by heat treatment at 110°C i.e. at Stage III is itself a vendable article of commerce. Such tape can be wound into rolls, or otherwise presented, and sold as a product for use in the garment industry by the normal heat and pressure methods known per se.

A variant of the embodiment of Fig. 1, as shown in Fig. 2 involves some small amount of stretching of the tape, that is to say, by about 5% or some other small but accurately known amount. This could be effected, e.g. as a Stage IIA, between Stages II and III. Thus, there is obtained by the 110°C pretreatment a tape of say 5% greater length than the original. This tape is then applied to the garment or to a waist band strip as described above and treated at 180°C. The amount by which it contracts, firstly to its neutral position, and secondly thereafter by an accurately predetermined amount, is known in advance and can be related as before to the available take up of dimension by causing the fibres of the garment panel to arrive closer together without overlapping and ruching.

Figure 3 shows a yet further embodiment of the invention. In this the elastic tape is so structured as to present no shrinkage on heating. It is referred to

therefore as tape 6a.

Such tape is provided with a layer of adhesive (Stage II) and then treated at 110° as before, but in an accurately known stretched condition. The adhesive goes on without causing the elasticised tape 6a to contract inwards. However, subsequently, when this pretreated stretched tape is placed beneath the margin 10 of a garment panel 11, or in a like environment to form a waistband, it will contract to the original neutral value (Stage 5), that is to say by an amount equivalent to the comfort amount of adjustment on a waistband.

CLAIMS:

1. A textile assembly comprising at least one non-elastic woven fabric element to a surface of which is adhered an elongate straight strip of material capable of elastic stretch and retraction: in which fabric element one set of woven threads is adhered at right angles or substantially at right angles, to the strip direction; and in which full retraction of the strip causes the threads of that set to approach one another, where they contact the strip, without causing corrugation or ruching of the fabric element; the elasticity of the strip permitting the textile element to be extended to the limits of its non-elastic weave.
2. An assembly as claimed in claim 1 which constitutes or forms part of a waistband for a skirt or trousers.
3. An assembly as claimed in claim 1 or 2 in which the elongate strip is located between two layers of textile, one being the fabric element and the other a bias-cut backing layer.
4. An assembly as claimed in claim 1, 2 or 3 in which the strip is formed generally as an elasticated waist band with an extensible cover extending over and mutually locating parallel threads of elastomeric material such as natural rubber.

5. An assembly as claimed in claim 4 in which the extensible cover is warp-knitted to accommodate the elasticity, and each elastomeric thread is wound with fine cotton to protect it and to ensure good union with the surrounding fabric.

6. An assembly as claimed in claim 4 or 5 in which the elastomeric threads possess an accurately known and reproducible shrinkage, up to 15% of original length, to within an accuracy of $\pm 1\%$, on application of heat adequate to melt a fusible PVC adhesive.

7. An assembly as claimed in claim 6 in which the degree of heat-shrinkage is from 5% to 15% and is accurate to $\pm 1\%$.

8. An assembly as claimed in claim 7 in which the degree of heat-shrinkage is from 6% to 12% and is accurate to $\pm 1\%$.

9. An assembly as claimed in claims 4 or 5 in which the elastomeric threads possess resistance to shrinkage and shrink less than 1% on heating to an extent adequate to melt a fusible PVC adhesive.

10. A method of providing a garment or the like made of inextensible fabric with a linear zone of limited and

concealed elasticity, in which:

(i) an elongate straight strip of material carrying at least one its surface a continuous or interrupted loading of fusible adhesive material; capable of elongate stretch and retraction; and in a relatively expanded form; is laid against a surface of the inextensible fabric at such an orientation that one set of threads thereof, preferably warp threads, extend at right angles or substantially at right angles to the strip

(ii) heat and pressure are applied to fuse the adhesive and cause the strip and fabric to adhere, and

(iii) the assembly is allowed to retract to the unstretched form:

the elongate strip being selected such that the extent of retraction to the unstretched form does not exceed that required to pull the threads closer together without thereby ruching or corrugating the fabric.

11. A method as claimed in claim 10 utilised to provide an elasticated waistband in a skirt or pair of trousers.

12. A method as claimed in claim 10 or 11 in which the

temperature utilised to fuse the adhesive is from 160°C to 180°C.

13. A method as claimed in claim 12 in which a prior heat treatment at 100 - 120°C is effected before the fixing of the band to the fabric.

14. A garment having a linear zone of limited and concealed elasticity made by the method as claimed in any one of claims 1 to 13.

15. An elasticated band of fabric material impregnated and/or coated with fusible synthetic polymer adhesive which has been subjected to heat and pressure at 100-120°C without causing retraction thereof.

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

9213051.7

Relevant Technical fields

(i) UK Cl (Edition K) A3V

(ii) Int Cl (Edition 5) A41F 9/00; 9/02

Databases (see over)

(i) UK Patent Office

(ii)

Search Examiner

D BUCKLEY

Date of Search

17.8.92

Documents considered relevant following a search in respect of claims

1 TO 14

| Category (see over) | Identity of document and relevant passages | Relevant to claim(s) |
|------------------------|--|----------------------------|
| P,X | GB 2241424 A (AUTOMATIC BRAIDING) 4 September 1991, lines 13 to 27 of page 7 and lines 14 to 23 of page 3 | 1,2,10, 11 and 14 |
| X | GB 1111786 (AUTOMATIC BRAIDING) lines 47 to 55 and 103 to 117 of page 3 | 1,2, and 14 at least |
| X | GB 1041792 (AUTOMATIC BRAIDING) lines 42 to 46 of page 1 and lines 20 to 25 of page 2 | 1,2, and 14 at least |
| X | GB 885642 (NOBELT LTD) lines 117 to 124 of page 2 | 1, 2 and 14 at least |
| X | GB 885641 (NOBELT LTD) lines 72 to 78 and 93 to 100 of page 2 | 1, 2 and 14 at least |

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ME - doc99\fil000219

| Category | Identity of document and relevant passages | Relevant to claim(s) |
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Categories of documents

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